

APR 29 1992

UNIVERSITY OF CALIFORNIA

CITY OF OAKLAND



CITY HALL • ONE CITY HALL PLAZA • OAKLAND, CALIFORNIA 94612

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January 28, 1992

HONORABLE CITY COUNCIL  
Oakland, California

Mayor Harris and Members of the City Council:

Subject: Background Information: General Obligation Bond for  
Citywide Emergency Preparedness and Fire Suppression  
District for the Fire Hazard Area

#### A. INTRODUCTION

As discussed in previous staff reports, the City of Oakland lies particularly vulnerable to a number of natural disasters that experts in the field are certain will occur in the coming years. Due to the topography of the Hills, dangerous weather conditions, and proximity to the Hayward Fault, the City needs to be as prepared as possible for the eventuality of a future wildland fire, landslide, or earthquake. Depending upon the magnitude of the disaster, the impact upon the local economy, residential property, and public infrastructure could be devastating.

Immediately following the October 20th firestorm, staff began an intensive review of the City's emergency planning, response, equipment, and facilities. This analysis has revealed a critical and immediate need to upgrade the City's infrastructure and emergency response capabilities citywide. Many of the City's municipal buildings including fire stations are in need of seismic retrofit. An improved Citywide communications system is needed to ensure adequate response in the event of an earthquake or fire disaster. An Emergency Operations Center should be established to manage an appropriate emergency response.

Although the October 20th event affected one segment of the Oakland Hills, the City must be prepared to confront future fires and seismic activity Citywide. To address some of the most basic and fundamental components of hazard mitigation and emergency preparedness, staff is proposing a General Obligation Bond for inclusion on the June 2, 1992 ballot.

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Clearly, the Oakland Hills neighborhoods are in need of additional fire prevention and suppression to mitigate the potential impact of future fires. To directly address the need for such critical activities, staff is proposing the creation of a Fire Prevention and Suppression District in the entire Oakland Hills and adjacent neighborhoods.

B. GENERAL OBLIGATION BOND FOR CITYWIDE EMERGENCY PREPAREDNESS

The ability of the City to respond in an emergency situation depends upon the stability of essential facilities and infrastructure; access to the necessary response equipment; and the ability to continue to communicate both internally and with the general public.

In accordance with staff's investigation and recommendations from the Mayor's Task Force on Community Restoration and Emergency Preparedness and other committees, the City urgently needs to reinforce its aged stock of firehouses; relocate police vehicles from under the Cypress freeway; provide backup power and protection for key communications systems; improve emergency dispatch and communications with other agencies; and provide evacuation and warning systems to alert the public.

Under the California Constitution, the City of Oakland may issue General Obligation Bonds for this project with a two-thirds vote of the electorate. The bonds may only be used for the acquisition of real property and associated fixtures, and will be financed over thirty years by a slight increase in the residential and commercial property tax rate. A bond measure raising approximately \$50 million will cost residents initially \$15 per \$100,000 assessed valuation; over the life of the thirty year financing, the average annual cost for residential properties will be approximately \$16 per \$100,000 assessed valuation.

It is important to note that, under California law, General Obligation Bonds may not be used to purchase equipment or rolling stock. Emergency response equipment such as vehicles and helicopters, another critical need for the City of Oakland, will require another form of financing in the future.

The following list outlines categories of improvements to be funded by the Emergency Preparedness Bond Act:

- Seismic reinforcement of fire stations and other essential public facilities: All city-owned fire stations and other facilities deemed to be essential in





the event of an emergency or disaster need to be evaluated and upgraded to withstand a 7.5 Hayward Fault earthquake. These facilities will be retrofit to a "life Safety" standard to allow firefighters and the vehicles to exit the facility following a seismic event.

- Relocation of Police vehicles from under the Cypress Freeway: Currently, the Police fleet of vehicles is stored under a portion of Highway 880. The fleet needs to be moved to a safe and accessible area in downtown Oakland which will most likely require the acquisition of additional property and construction of a parking structure.
- Seismic reinforcement of the City's Maintenance Yards.
- Additional seismic evaluations of critical infrastructure.
- Local share for seismic reinforcement of essential local bridges and roadways: The State of California has a Seismic Retrofit Program to analyze, prioritize, and partially fund bridge upgrades. It is anticipated that state and federal funds would pay for 70% of the cost to retrofit unsafe bridges. / The City of Oakland needs to evaluate City-owned bridges and contribute the remaining 30% of required retrofit costs.
- Upgrade and backup for the Dispatch communications system: The City must make critical improvements to its primary and alternate communications system to provide efficient and timely communication between responding City departments, mutual aid support, and other outside agencies. The Dispatch center at Fire Department Headquarters needs to be expanded to promote proper utilization of this system.
- Emergency generators for essential City and School facilities: In most localized emergencies, power can fail and render vital facilities and equipment inoperative. Generators are needed to supply backup power at the shelters, for Police and Fire Department activities, and for other essential City-owned facilities.





- Construction of an Emergency Operations Center (EOC):  
The EOC provides for centralized and coordinated direction and control for all potential emergency efforts. During an emergency, all related personnel would take direction from the center which would house a survivable communications system. Currently, the City uses a small portion of one fire station as its primary EOC. The facility needs to be adequately sized and equipped to meet the extreme demands of the City's overall response and recovery effort following a major event.

In response to the October 20th fire, the City's Office of Computer Information Services (OCIS) teamed up with the California Department of Forestry to create a Geographic Information System (GIS) which outlines detailed geographic and topographic information on each parcel in the burn area; this system has been of enormous value in the damage assessment and recovery effort. A GIS system can also be used for hazard identification for dispatch and to track response teams.

- Improvements to emergency shelters: During both the Loma Prieta earthquake and the Oakland Hills firestorm, finding shelter for victims was a high priority. The City utilizes the Oakland School District's high schools during these emergencies; these facilities must be seismically-reinforced, handicapped accessible, and need other improvements to meet the diverse needs of a temporarily-displaced population.
- Implementation of new Alerting and Warning systems: During an emergency, the rapid and effective dissemination of instructions and other essential information can significantly help to reduce the loss of life and property. Warning systems such as sirens, whistles, and horns, strategically located within the community, can be used to aid evacuation efforts. In addition, the technology now exists to incorporate media, telephone, and radio systems into this communications system.





## C. OAKLAND HILLS FIRE PREVENTION AND SUPPRESSION DISTRICT

The second proposal recommended by staff as well as the Mayor's Task Force is the creation of an Oakland Hills Fire Prevention and Suppression Assessment District. The District would provide specialized services to the Oakland Hills and adjacent areas to help mitigate fire risks and provide improved fire suppression in the event of a fire during extreme fire hazard conditions. A revised map and list of streets outlining the areas to be included in this special assessment district is attached in Appendix A; the area has been extended to include neighborhoods adjacent to the fire hazard areas that may also be susceptible to a spreading wildland fire.

Possible activities to be funded include:

- a) Additional fire personnel and equipment throughout the Hills during extreme fire weather conditions. The Fire Department is investigating the best means to improve fire suppression activities in the Hills.
- b) The establishment of a Fire Prevention Unit to educate residents on the importance of fire safety measures and the enforcement of fuel reduction ordinances for private property.
- c) The creation of a Fuel Reduction Unit to manage vegetation on City property and right-of-ways; trim overgrown shrubbery; remove dead vegetation; implement a tree replanting program; and maintain established fuel breaks. Another service to be managed by this unit will provide seasonal pickup and disposal of tree and brush trimmings from private property in the District.
- e) Improvement of emergency access and evacuation routes by installing appropriate signage and pavement markings. Traffic engineers will implement parking restrictions to maintain minimum widths on emergency access routes and residential streets. A nighttime parking enforcement program will be created to ensure adequate access is maintained; this program is intended to be self-financing.
- f) Citizen training will be a key component of the District's activities. The City's C.O.R.E. Program (Citizens of Oakland Responding to Emergencies) will be expanded to teach basic disaster response skills to a broader range of Oakland residents. In addition to modules on "Individual and Family Survival", "Organizing Neighborhood Response

# THE EFFECTS OF THE 1988-1989 DROUGHT ON THE

The 1988-1989 drought in the United States was one of the most severe in the country's history. It began in the summer of 1988 and continued through the spring of 1989. The drought was caused by a combination of factors, including a lack of rainfall and a high rate of evaporation. The drought had a significant impact on the country's economy, particularly in the agricultural sector. Many crops were lost, and the price of food increased. The drought also had a significant impact on the environment. Many rivers and streams dried up, and the land became barren. The drought was a major disaster for the United States, and it is important to study its effects in order to prevent such a disaster from happening again.

## 1. INTRODUCTION

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Teams", and "Advanced Citizen Response", a special fire training module will be developed to teach skills in Fire Suppression, Search and Rescue, Response Team Planning, Evacuation Planning and Training, First Aid and CPR certification.

#### SCHEDULE FOR GENERAL OBLIGATION BOND

Due to the critical nature of the proposed improvements and the amount of time it will take to implement these upgrades, staff is moving quickly to prepare the General Obligation Bond measure for inclusion in the June 2, 1992 election. Since the ballot measure must be in the hands of the County Clerk 88 days prior to the election date, the measure must be approved by the City Council before March 6, 1992.

To meet this deadline, staff will present a resolution to the City Council for consideration at the February 11, 1992 meeting. The following schedule will be required to meet the March 6th deadline for inclusion on the ballot in June:

February 11	-	Passage of Resolution of Necessity
February 25	-	Introduction of Ordinance and Passage of Second Resolution
March 3	-	Second Reading of Ordinance
March 6	-	Submission to County Clerk

#### CONCLUSION

The schedule for placing the proposed Emergency Preparedness Bond on the June 2, 1992 ballot requires an accelerated schedule. Staff recommends that this issue be brought before the Finance Committee on February 4, 1992.

The Fire Prevention and Suppression Assessment District must meet assessment law standards established by the City Attorney's Office. The Mayor's Task Force report will address this issue and homeowners associations have asked to be included in the formation



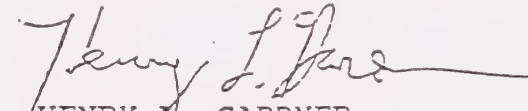


January 28, 1992

and design of the District. Staff recommends that this issue be addressed more completely following the issuance of the Mayor's Task Force's final report. Staff recommends that the District be in place by July, 1992.

The City still needs to address the need for additional emergency equipment for both the Police and Fire Department. The General Obligation Bond may not be used for such purpose. Staff will continue to explore means to finance appropriate equipment to meet the City's minimum response needs.

Respectfully submitted,

  
HENRY L. GARDNER  
City Manager

Attachment

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APPENDIX

Appendix A      Revised Map of the Fire Prevention and Suppression  
District; List of Streets to be Included





# REVISED MAP

## FIRE PREVENTION AND SUPPRESSION DISTRICT





REVISED MAP (CONTINUED)







# FIRE SUPPRESSION SPECIAL ASSESSMENT DISTRICT

STARTING AT COLLEGE AVE. AND THE BERKELEY CITY LINE

- East on College Ave. to Keith Ave.
- North on Keith Av to Broadway
- South on Broadway to Lawton Ave.
- East on Lawton to Margarido Dr.
- South on Margarido Dr. to Broadway Terrace
- North on Broadway Terrace to Clarewood Dr.
- East on Clarewood Dr. along Mountain View Cemetery Border to Piedmont City Limit
- East along Piedmont City Border to Park Blvd.
- South on Park Blvd. to Dolores Ave.
- East on Delores Ave. to El Centro Rd.
- East on El Centro Rd. to Vista St.
- South on Vista St. to Wellington St. and Dimond Park Border
- East along Dimond Park Border to Fruitvale Ave.
- North on Fruitvale Ave. to Whittle Ave.
- North on Whittle Ave. to Tiffin Rd.
- East on Tiffin Rd. to Lincoln Ave.
- North on Lincoln Ave. to Alida St.
- East on Alida St. to Coolidge Ave.
- South on Coolidge to Morgan Ave.
- East on Morgan Ave. to Maple Ave.
- North on Maple Ave. to Carlsen St.
- East on Carlsen St. to Wisconsin St.
- East on Wisconsin St. to dead end.
- HFA Boundary continues east to Maybelle Ave. and Thompkins Ave.
- East on Thompkins Ave. to Buell St.
- South on Buell St. to MacArthur Blvd.
- East on MacArthur Blvd. around Mills College to Seminary Ave.
- North on Seminary to Outlook Ave.
- East on Outlook Ave. to Partridge Ave.
- North on Partridge Ave. to Utah St.
- East on Utah St. to 82nd Ave.
- South on 82nd Ave. to MacArthur Blvd.
- East on MacArthur Blvd. across from the Intersection of Thermal St. & Seneca St.
- North to the Intersection of Thermal & Seneca St.
- East on Thermal to Burr St.
- East on Burr St. to Stearns Ave.
- East on Stearns Ave. to 98th Ave.
- North on 98th Ave. to Stanley Blvd.
- East on Stanley Blvd. to Foothill Blvd.
- East on Foothill Blvd. to San Leandro City Line.





FIRE HAZARD  
AREA



ATTACHMENT A-1



## OAKLAND HAZARDOUS FIRE AREA BOUNDARY CRITERIA

As demonstrated by the recent hill fire, urban/wildland interface area represents a critical fire and life safety risk because the danger of fire spread from wildland areas into adjoining heavily populated areas. Additionally, structural fires have the potential to become wildland fires. The movement of people into areas of flammable natural vegetation increases the probabilities of accidental and/or intentional ignition which in turn increases the risk of a fire disaster.

The Fire Department is charged with the responsibility of providing efficient fire protection for the Oakland urban/wildland interface area. Consistent standards are essential to the control of development and redevelopment in the hazardous fire area. The following critical factors were used to define and develop criteria for the Hazardous Fire Area:

- (1) Fire Department access routes
- (2) Fire Department response times
- (3) Adequacy of water supply
- (4) Vegetation fuel load
- (5) Building locations in relations to slope
- (6) Construction methods and materials
- (7) Proximity of structures adjacent to the Hazardous Fire Area

### FIRE DEPARTMENT ACCESS

- Narrow winding streets
- Excessively long dead end streets
- Steep grades

### FIRE DEPARTMENT RESPONSE TIME

- Response time to areas more than 4 minutes from the nearest fire station

### ADEQUACY OF WATER SUPPLY

- Hydrant spacing - hydrants spaced more than 500 ft considered excessive
- Areas with a fire flow of less than 1000gpm considered inadequate
- Low water pressure areas

### VEGETATION FUEL LOAD

- Built-up residential areas intermingled with highly flammable vegetation considered extraordinary fire hazard

### BUILDING LOCATIONS IN RELATIONS TO SLOPE

- Homes built on difficult sites - steep uphill and steep downhill lots impact fire fighting and rescue operations
- Neighborhood~Home density

### CONSTRUCTION METHODS AND MATERIALS

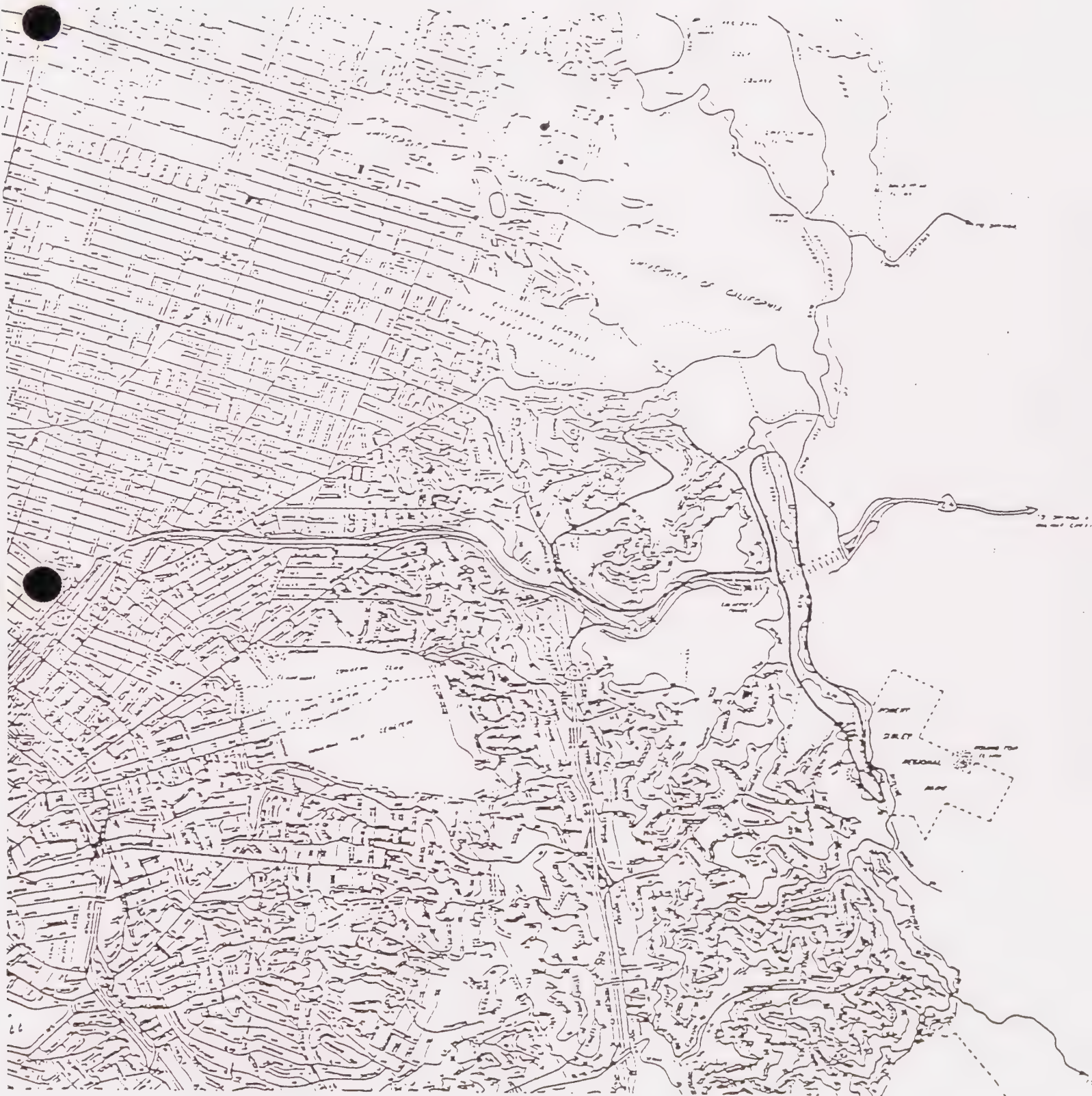
- Homes built with highly combustible materials - wood shake roofs

### PROXIMITY OF STRUCTURES ADJACENT TO THE HAZARDOUS FIRE AREA





EXTREME FIRE HAZARD AREA







List of Streets Located Within the  
Extreme Fire Hazard Area

Bay Forest  
Besito  
Bristol  
Buckingham  
Caldecott  
Chancellor  
Charing Cross  
Dawn  
Devon  
Drury  
Grand View (portions)  
Grizzly Peak  
Hiller Highlands (all)  
Kenilworth  
Kent  
Marlborough  
Norfolk  
Sherwick  
Strathmoor  
Tunnel  
Westmoorland



The map illustrates the Oakland Hills Fire Area, highlighting evacuation routes and various sections. Key features include:

- Streets and Landmarks:** Alvarado, Strathmoor, Marlborough Terrace, Canyon View, and Tunnel Rd are labeled. The map also shows various residential areas and a large open area in the center.
- Evacuation Routes:** Indicated by thick black lines, these routes are shown throughout the area, particularly following the ridges and valleys.
- Sections:** The map is divided into several sections, with labels for SECTION 1, SECTION 2, SECTION 3, and SECTION 4.
- Key:** A key in the bottom right corner identifies the symbols used, including a thick black line for "PROPOSED" routes and a thin line for "EXISTING" routes.
- North Arrow:** Located in the top right corner, it points towards the top of the map.

## SECTION 1

## KEY

PROPOSED BY

— 176 —

City of Chicago

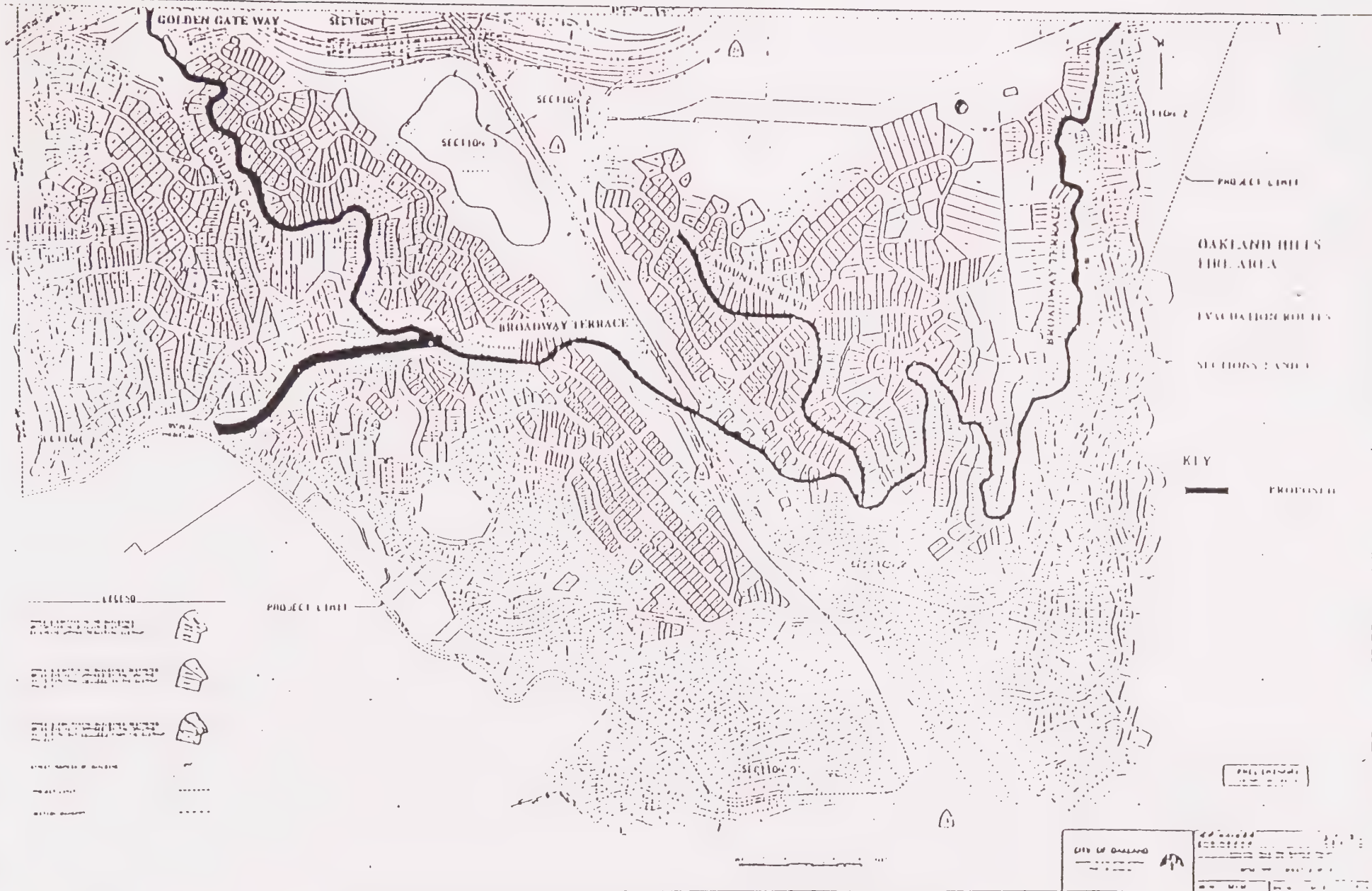
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APPENDIX C-2











**LEGEND**

- Fire Response Route (thick solid line)
- Fire Response Area (hatched area)
- Fire Response Zone (dotted area)

**KEY**

- PROJECT LIMIT (dashed line)
- FIRE RESPONSE ROUTE (thick solid line)

**TITLE BLOCK**

PROJECT NAME: OAKLAND HILLS FIRE AREA  
 DATE: 10/1/77  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]



## SIDING MATERIALS, DECKS, PROJECTIONS, AND OVERHANGS

**Proposal:** If 50% or more of the wall or projection requires repair or replacement, the ~~entire~~ wall and all projections shall conform to code and to this ordinance. The exterior wall surface, whether horizontal or vertical (other than 7/8" three-coat stucco), must have a tightly sealed underlayment of 1/2" Type "X" gypsum sheathing under 3/8" plywood or 3/4" drop siding or an approved alternate. If the wall covering is wood shingle, it may only be replaced with fire-retardant, pressure-treated wood shingle and only in conjunction with a vegetation management program. Wood shake wall covering shall not be allowed regardless of the existence of a vegetative management program.

Projections from the exterior wall, (e.g., decks, balconies, roof overhangs, carports, and attached patio covers) without walls may be constructed of any materials and/or methods approved by the Uniform Building Code. The attachment of these projections to the exterior fire-resistive wall shall be constructed so as to maintain the fire integrity of the wall.

All exterior walls are required to be protected with double blocking (two - 2" nominal solid blocking) between rafters at all roof overhangs under the exterior wall covering. No attic ventilation openings or ventilation louvers shall be permitted in soffits, eave overhangs, between rafters at eaves, or other overhanging areas. Attic or foundation ventilation louvers or ventilation openings in vertical walls shall not exceed one hundred and forty-four (144) square inches per opening and shall be covered with 1/4 inch mesh corrosion resistant metal screen.

If less than 50% of the wall, accessory structure, or projection requires repair or replacement, the existing walls, structures, and projections such as decks or eaves may be replaced in-kind. If the wall covering is wood shingle or wood shake, it may only be replaced with fire-retardant, pressure-treated wood shingle.

For enclosed patio covers, enclosed decks, sunrooms, and solariums where the wall between the living area and the enclosure is more than 50% open, the exterior horizontal and vertical surfaces shall meet the requirements as stated in the first paragraph above.

If the wall between the living area and the enclosure is less than 50% open, the wall must meet the fire-resistive requirements as stated in the first paragraph above. The exterior horizontal and vertical surfaces of the enclosure may be constructed of any materials and/or methods approved by the Uniform Building Code as long as the attachment of such structures to the fire-resistive wall maintains the fire integrity of the wall.

**Background:** Only the North Oakland Hill Area Specific Plan (NOHASP) provides requirements for siding and projections. NOHASP includes approximately 10% of the Oakland Hills Fire Damaged Area and dictates that 1) projections from walls of Type III, IV, or V construction may be noncombustible or combustible materials, and 2) combustible exterior balconies, unenclosed roofs and floors, eaves and similar architectural appendages on structures subject to the provisions of the NOHASP and located





within thirty (30) feet of another building or group of buildings (interpreted as 15' from the property line) shall be one-hour fire-resistant construction or heavy timber construction conforming to UBC, Section 2106 or protected with an automatic fire extinguishing system. Other requirements relate to wall and opening protection of occupancy based on location of property as described in Table 5A of the Oakland Building Code and the Oakland Fire Code.

**Analysis:** The primary purpose of fire-resistant siding and protection for overhangs is to slow or stop an exterior fire from spreading to the interior of a structure. Materials such as masonry or stucco provide both a non-combustible surface and a thermal mass that slow heat transfer to the house. Combustible materials may provide additional fuel to augment heat transfer to the house if additional precautions are not taken.

If one-hour fire-resistant construction is used for all exterior walls, 4" nominal solid blocking (double 2" blocking) between rafters at all roof overhangs under the exterior wall covering, restricted attic and foundation ventilation openings, and vegetative management along external walls are regulated, the fire danger from exterior fire spreading to the interior of a structure is greatly reduced. Therefore, the exterior wall covering material (over the fire restrictive construction elements) shall not be restricted, as long as it complies with UBC requirements. However, to minimize flame spread, any wood shingle materials must be pressure treated for fire resistance prior to use.

Restricting attic ventilation openings from under eaves or projections can be compensated by using various other UBC approved ventilation techniques. Some alternatives include gable vents, ridge vents, eyebrow vents, and power ventilation.

Decks, projections, and overhangs present a hazard for fire by creating additional fuel and pockets for potential heat build-up. Allowing these elements to burn does not compromise the fire resistive integrity of the main structure and will eliminate the entrapment of heat pockets. Therefore, the materials for these structures shall not be restricted.



They are automatic; they are contained in a localized area; they are cost-effective. Once the system is installed, it works automatically regardless of whether or not there are occupants in the house.

Promoting automatic fire sprinkler systems becomes a lesson in community advocacy: public education and fire safety awareness combined with automatic fire sprinkler systems becomes an effective fire deterrent; utilizing these fire-suppression methods equal safer homes and safer communities.

## 2.2 The 13-D System

The automatic fire sprinkler system which is currently advocated and utilized throughout the country is the 13-D System. This system has been researched and approved by the National Fire Protection Association (NFPA). The 13-D System is the "standard for the installation of sprinkler systems in one- and two-family dwellings and mobile homes." The 13-D System standard has guided most communities in establishing their requirements for the installation of residential sprinklers.

### 2.2.1 Requirements

Some of the standard requirements for the 13-D System include:

- minimum pipe sizes of 3/4" polybutylene (the least expensive), 3/4" copper, 1" steel
- maximum distance between sprinklers = 12' (feet)
- maximum distance to a wall or partition = 6' (feet)
- maximum area protected by a single sprinkler = 144 square feet
- provide a discharge of not less than 18 gallons per minute (g.p.m.) to any single operating sprinkler
- number of design sprinklers shall include all sprinklers within a compartment, to a maximum of two (2) sprinklers

The 13-D System can be installed by sprinkler contractors, plumbers, homeowners, or subcontractors provided that the system is installed in accordance with required code standards and inspected for adherence to applicable code requirements.

Copper, steel, CPVC plastic and polybutylene have been tested and listed by the Underwriters Laboratories for use in sprinkler systems. In addition to the components of the piping, an applicable water supply system is needed.

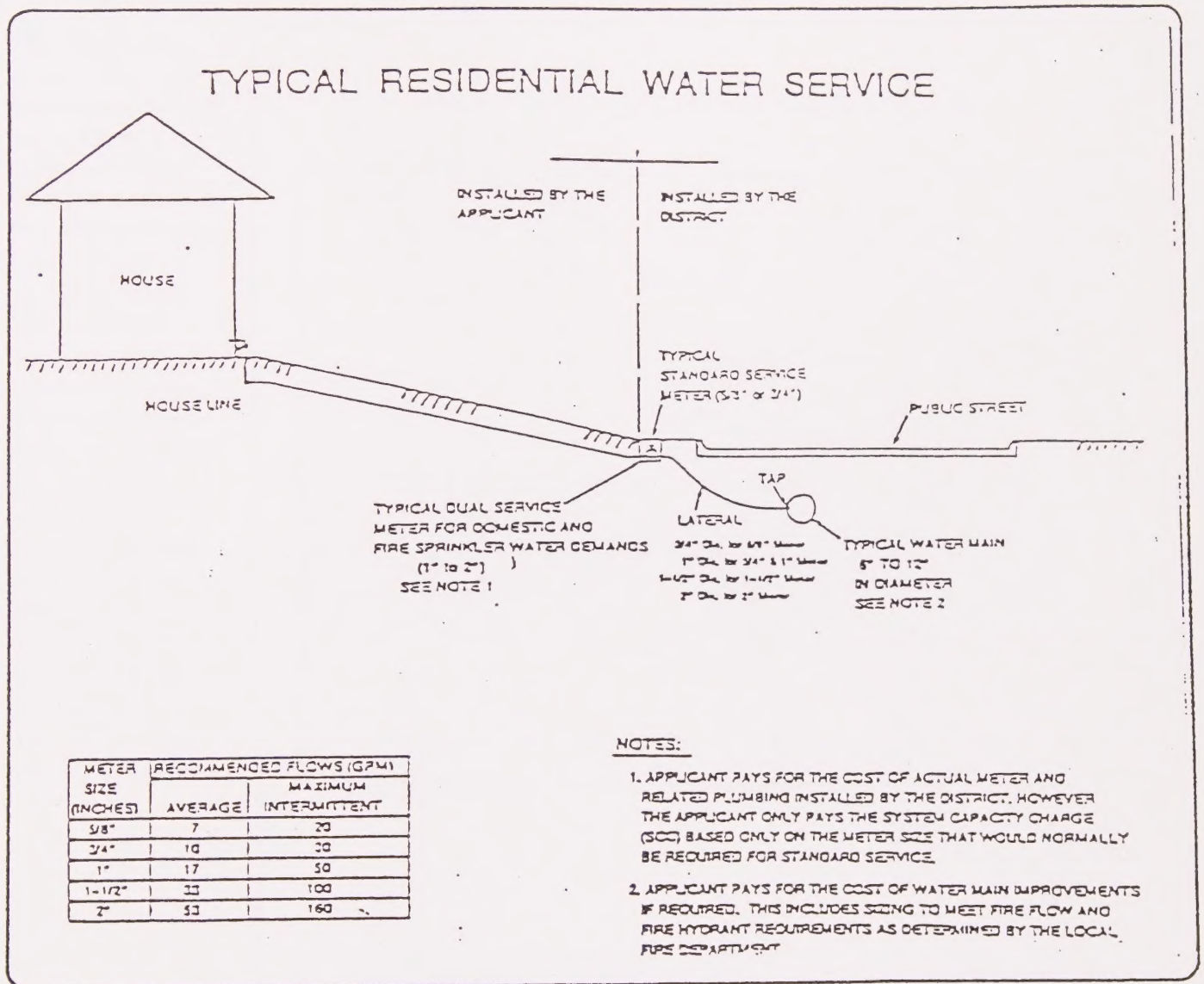
### 2.2.2 How the 13-D System Works

The 13-D System reacts to temperatures in each individual room where the sprinkler heads are mounted. A sprinkler installed in a bedroom will be activated only by a fire in the bedroom. False activation has proven to be of minimum consequence during a 50-year record-keeping period.





FIGURE 2.2.3.2 TYPICAL RESIDENTIAL WATER SERVICE



This figure illustrates the single-family dwelling and the water lines (piping considerations) which are installed as part of the automatic fire sprinkler system. A water meter which is installed as the basic water meter in an Oakland hill-area dwelling, will need to be upgraded to conform to automatic fire sprinkler system requirements. The estimated costs are described in Figure 2.2.3.1 *The Oakland Proposal* on the previous page.

# THE HISTORY OF THE UNITED STATES



The history of the United States is a complex and multifaceted story. It begins with the first people to inhabit the land, followed by the arrival of European settlers. The country grew from a small colony into a powerful nation, facing numerous challenges along the way. The American Revolution, the Civil War, and the struggle for civil rights are all key moments in the nation's history. Today, the United States is a global superpower, with a rich cultural heritage and a diverse population.

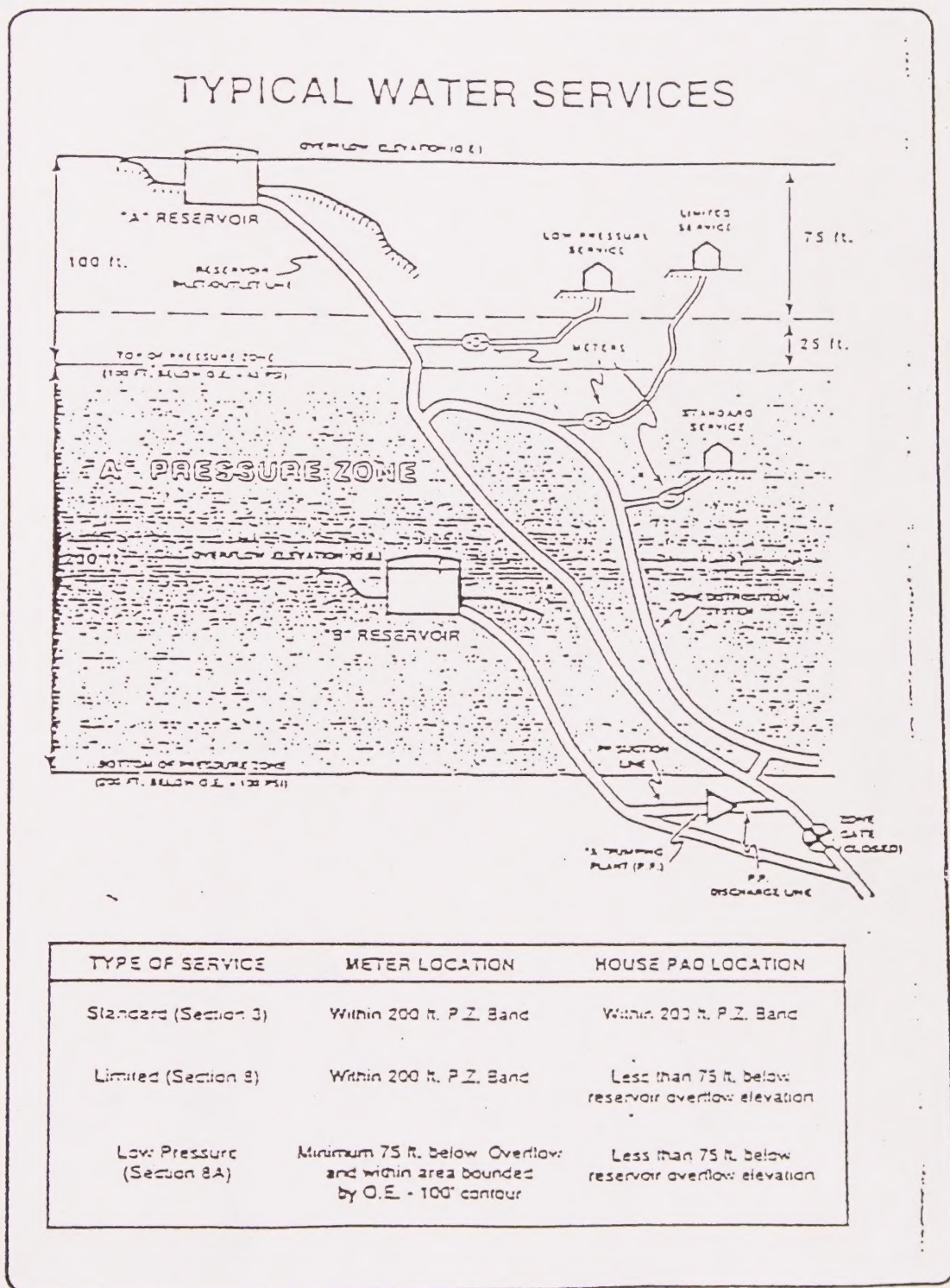
Year	Event
1776	Declaration of Independence
1787	Constitution signed
1861-1865	Civil War
1868	14th Amendment
1870	15th Amendment
1896	Plessy vs. Ferguson
1954	Brown vs. Board of Education
1963	March on Washington
1968	Assassination of Martin Luther King Jr.
1975	End of Vietnam War
1981	Iranian Hostage Crisis
1989	End of Cold War
1991	Gulf War
1993	World Trade Center attacks
2001	9/11 attacks
2003	Iraq War
2008	Financial Crisis
2009	Obama elected President
2013	Assassination of President Kennedy
2017	Trump elected President
2020	COVID-19 Pandemic

The United States has a long and storied history, and its future is uncertain. The country has faced many challenges, but it has always emerged stronger and more united. The American dream is a powerful force, and it continues to inspire people around the world. The United States is a land of opportunity, and it is a place where anyone can make their mark. The history of the United States is a testament to the power of the human spirit, and it is a story that will continue to be told for generations to come.



FIGURE 2.2.3.3 TYPICAL WATER SERVICES

This figure illustrates dwellings above and below the pressure zone, and how water is pumped into these dwellings. Water pressure is significantly lowered when dwellings are "on top" of the pressure zone, as seen by the "low pressure service" and "limited service" dwellings in this figure. The "standard service" dwelling in this figure lies well within the pressure zone.





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# THEORY OF PROBABILITY



1. The probability of an event occurring is a measure of the likelihood that the event will occur.	2. The probability of an event occurring is a measure of the likelihood that the event will occur.
3. The probability of an event occurring is a measure of the likelihood that the event will occur.	4. The probability of an event occurring is a measure of the likelihood that the event will occur.
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9. The probability of an event occurring is a measure of the likelihood that the event will occur.	10. The probability of an event occurring is a measure of the likelihood that the event will occur.